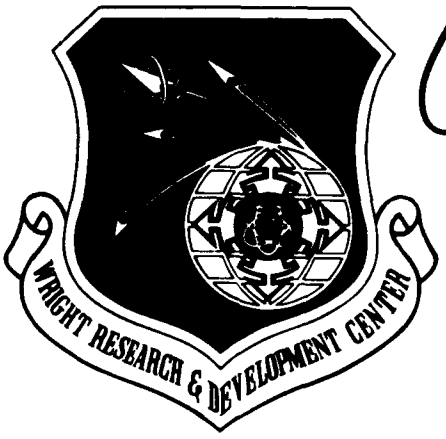
WRDC-TR-90-8007
Volume V
Part 21



INTEGRATED INFORMATION SUPPORT SYSTEM (IISS)
Volume V - Common Data Model Subsystem
Part 21 - Neutral Data Manipulation Language (NDML) Precompiler
Generate Total Request Processor Product Specification

M. Apicella, J. Slaton, B. Levi

Control Data Corporation
Integration Technology Services
2970 Presidential Drive
Fairborn, OH 45324-6209

September 1990

Final Report for Period 1 April 1987 - 31 December 1990

MANUFACTURING TECHNOLOGY DIRECTORATE
WRIGHT RESEARCH AND DEVELOPMENT CENTER
AIR FORCE SYSTEMS COMMAND
WRIGHT-PATTERSON AIR FORCE BASE, OHIO 45433-6533

NOTICE

When Government drawings, specifications, or other data are used for any purpose other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever, regardless whether or not the government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data. It should not, therefore, be construed or implied by any person, persons, or organization that the Government is licensing or conveying any rights or permission to manufacture, use, or market any patented invention that may in any way be related thereto.

This technical report has been reviewed and is approved for publication.

This report is releasable to the National Technical Information Service (NTIS). At NTIS, it will be available to the general public, including foreign nations

25 July 91

DAVID L. JUDSON, Project Manager
WRDC/MTI
Wright-Patterson AFB, OH 45433-6533

DATE

FOR THE COMMANDER:

25 July 91

BRUCE A. RASMUSSEN, Chief
WRDC/MTI
Wright-Patterson AFB, OH 45433-6533

DATE

If your address has changed, if you wish to be removed form our mailing list, or if the addressee is no longer employed by your organization please notify WRDC/MTI, Wright-Patterson Air Force Base, OH 45433-6533 to help us maintain a current mailing list.

Copies of this report should not be returned unless return is required by security considerations, contractual obligations, or notice on a specific document.

REPORT DOCUMENTATION PAGE

1a. REPORT SECURITY CLASSIFICATION Unclassified	1b. RESTRICTIVE MARKINGS
2a. SECURITY CLASSIFICATION AUTHORITY	3. DISTRIBUTION/AVAILABILITY OF REPORT Approved for Public Release; Distribution is Unlimited.
2b. DECLASSIFICATION/DOWNGRADING SCHEDULE	
4. PERFORMING ORGANIZATION REPORT NUMBER(S) PS 620341256	5. MONITORING ORGANIZATION REPORT NUMBER(S) WRDC-TR-90-8007 Vol. V, Part 21
6a. NAME OF PERFORMING ORGANIZATION Control Data Corporation; Integration Technology Services 6b. OFFICE SYMBOL *(if applicable)*	7a. NAME OF MONITORING ORGANIZATION WRDC/MTI
6c. ADDRESS *(City, State, and ZIP Code)* 2970 Presidential Drive Fairborn, OH 45324-6209	7b. ADDRESS *(City, State, and ZIP Code)* WPAFB, OH 45433-6533
8a. NAME OF FUNDING/SPONSORING ORGANIZATION Wright Research and Development Center, Air Force Systems Command, USAF 8b. OFFICE SYMBOL *(if applicable)* WRDC/MTI	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUM. F33600-87-C-0464
8c. ADDRESS *(City, State, and ZIP Code)* Wright-Patterson AFB, Ohio 45433-6533	10. SOURCE OF FUNDING NOS.
11. TITLE *(Include Security Classification)* See block 19 t Processor Prod. Spec.	PROGRAM ELEMENT NO.: 78011F; PROJECT NO.: 595600; TASK NO.: F95600; WORK UNIT NO.: 20950607
12. PERSONAL AUTHOR(S) Control Data Corporation: Apicella, M. L., Slaton, J., Levi, B., Pashak, A.	
13a. TYPE OF REPORT Final Report 13b. TIME COVERED 4/1/87-12/30/90	14. DATE OF REPORT *(Yr.,Mo.,Day)* 1990 September 30 15. PAGE COUNT 37
16. SUPPLEMENTARY NOTATION WRDC/MTI Project Priority 6203	

17. COSATI CODES			18. SUBJECT TERMS *(Continue on reverse if necessary and identify block no.)*
FIELD	GROUP	SUB GR.	
1308	0905		

19. ABSTRACT *(Continue on reverse if necessary and identify block number)*

This document establishes the design of Function PRE9.4, "Generate TOTAL Request Processor". one of the major functions of the Configuration Item (CI) "Precompiler" to be built and formally accepted by the ICAM program office.

BLOCK 11:

INTEGRATED INFORMATION SUPPORT SYSTEM
Vol V - Common Data Model Subsystem

Part 21 - Neutral Data Manipulation Language (NDML) Precomplier Generate Total Request Processor Product Specification

20. DISTRIBUTION/AVAILABILITY OF ABSTRACT UNCLASSIFIED/UNLIMITED x SAME AS RPT. DTIC USERS	21. ABSTRACT SECURITY CLASSIFICATION Unclassified
22a. NAME OF RESPONSIBLE INDIVIDUAL David L. Judson	22b. TELEPHONE NO. *(Include Area Code)* (513) 255-7371 22c. OFFICE SYMBOL WRDC/MTI

EDITION OF 1 JAN 73 IS OBSOLETE

DD FORM 1473, 83 APR

FOREWORD

This technical report covers work performed under Air Force Contract F33600-87-C-0464, DAPro Project. This contract is sponsored by the Manufacturing Technology Directorate, Air Force Systems Command, Wright-Patterson Air Force Base, Ohio. It was administered under the technical direction of Mr. Bruce A. Rasmussen, Branch Chief, Integration Technology Division, Manufacturing Technology Directorate, through Mr. David L. Judson, Project Manager. The Prime Contractor was Integration Technology Services, Software Programs Division, of the Control Data Corporation, Dayton, Ohio, under the direction of Mr. W. A. Osborne. The DAPro Project Manager for Control Data Corporation was Mr. Jimmy P. Maxwell.

The DAPro project was created to continue the development, test, and demonstration of the Integrated Information Support System (IISS). The IISS technology work comprises enhancements to IISS software and the establishment and operation of IISS test bed hardware and communications for developers and users.

The following list names the Control Data Corporation subcontractors and their contributing activities:

SUBCONTRACTOR	ROLE
Control Data Corporation	Responsible for the overall Common Data Model design development and implementation, IISS integration and test, and technology transfer of IISS.
D. Appleton Company	Responsible for providing software information services for the Common Data Model and IDEF1X integration methodology.
ONTEK	Responsible for defining and testing a representative integrated system base in Artificial Intelligence techniques to establish fitness for use.
Simpact Corporation	Responsible for Communication development.
Structural Dynamics Research Corporation	Responsible for User Interfaces, Virtual Terminal Interface,and Network Transaction Manager design, development, implementation, and support.
Arizona State University	Responsible for test bed operations and support.

TABLE OF CONTENTS

SECTION 1

SCOPE

1.1 Identification

This specification establishes the design of Function PRE9.4, "Generate TOTAL Request Processor", one of the major functions of the Configuration Item (CI) "Precompiler" to be built and formally accepted by the ICAM Program Office. This CI constitutes one of the subsystems of the Common Data Model Processor (CDMP).

1.2 Functional Summary

The purpose of this Computer Program Configuration Item (CPCI) is to generate a COBOL program that will satisfy a retrieval or update NDML subtransaction against a TOTAL database.

The following functions will be performed by this CPCI:

1. Generate the Data Division section of the Request Processor.

    a) Generate file description and record layout if the NDML request resulted in a retrieval subtransaction.

2. Generate the Working Storage section of the Request Processor. These working storage variables will be used for:

    a) Conceptual/internal transformation of retrieval search parameters or update values.
    b) Internal/conceptual transformation of retrieved data fields.
    c) DBMS status checks and reserved words.
    d) Retrieved qualification variables.
    e) TOTAL file descriptions and data field descriptions.

3. Generate the Procedure Division section of the Request Processor. It will include all the code to access a particular TOTAL database in order to satisfy the NDML request. This code will consist of:

    a) Interface code to the Request Processor Main program at runtime.
    b) Code to transform the retrieval search parameters or update values from conceptual to internal format.
    c) Code using DBMS specific calls to access the database to retrieve data or update data.

d) Code to transform the retrieved data from internal to conceptual format.
e) Code to save the retrieved data on a sequential file.
f) Code to check DBMS status and report errors during runtime execution.

SECTION 2

DOCUMENTS

2.1 Reference Documents

1. ICAM Documentation Standards: IDS15012000A, 28 December 1981.

2. D. Appleton Co., CDM Administrator's Manual; UM620141000, March 1984.

3. D. Appleton Co., CDM1-IDEF, Model of the Common Data Model; CCS620141000, 15 May 1985.

4. D. Appleton Co., Computer Program Development Specification (DS) for ICAM Integrated Support System (IISS) Configuration Item: NDML Precompiler; DS620141200, October 1984.

5. D. Appleton Co., Embedded NDML Programmer's Reference Manual; PRM620141200, March 1985.

6. Softech, Inc., NTM Programmer's Guide; UM620140001, July 1984.

7. Control Data Corp., Computer Development Specification (DS) for ICAM Integrated Support System (IISS) Configuration Item: NDDL Command Processor: DS620141100, June 1985.

2.2 Terms and Abbreviations

Attribute Use Class: (AUC)

Conceptual Schema: (CS)

Common Data Model Processor: (CDMP)

Common Data Model: (CDM) Describes common data application process formats, form definitions, etc, of the IISS and includes conceptual schema, external, internal schemas, and schema transformation operators.

Data Field: (DF) An element of data in the external schema. It is by this name that an NDML programmer references data.

Database Management System: (DBMS)

Distributed Request Supervisor: (DRS) This IISS CDM subsystem configuration item controls the execution of distributed NDML queries and non distributed updates.

Domain: A logical definition of legal attribute class values.

Domain Constraint: Predicate that applies to a single domain.

External Schema: (ES)

Forms: Structured views which may be imposed on windows or other forms. A form is composed of fields where each field is a form, item, or window.

Forms Processor: (FP) A set of callable execution time routines available to an application program for form processing.

Internal Schema: (IS)

Integrated Information Support System: (IISS) A test computing environment used to investigate, demonstrate and test the concepts of information management and information integration in the context of Aerospace Manufacturing. The IISS addresses the problems of integration of data resident on heterogeneous databases supported by heterogeneous computers interconnected via a local Area Network.

Mapping: The correspondence of independent objects in two schemas: ES to CS or CS to IS.

Network Transaction Manager: (NTM) Performs the coordination, communication and housekeeping functions required to integrate the application processes and system services resident on the various hosts into a cohesive system.

Neutral Data Manipulation Language: (NDML) A language developed by the IISS project to provide uniform access to common data, regardless of database manager or distribution criteria. It provides distributed retrieved and single node updates.

ORACLE: Relational DBMS based on the SQL (Structured Query Language, a product of ORACLE Corp, Menlo Park, CA). The CDM is an ORACLE database.

Parcel: A sequential file containing section source code of the input application program.

Request Processor: (RP) A COBOL program that will satisfy a retrieval or update NDML subtransaction against a particular Database Management System.

User Interface: (UI) Controls the user's terminal and interfaces with the rest of the system.

Virtual Terminal Interface: (VTI) Performs the interfacing between different terminals and the UI. This is done by defining a specific set of terminal features and protocols which

must be supported by UI software which constitutes the Virtual Terminal Definition. Specific terminals are then mapped against the Virtual Terminal software by specific software modules written for each type of real terminal supported.

SECTION 3

REQUIREMENTS

3.1 Structural Description

A graphic portrayal of this CPCI is included in Section 3.10. This chart shows the hierarchical relationships of each module making up this CPCI.

This CPCI is identified as module CDQPT and uses a number of lower level modules to handle specific operations such as:

1. Generate conceptual schema data definitions for retrieved data fields (CDRFT).
2. Generate internal schema data definitions for runtime search parameters (CDPRM).
3. Generate internal schema data definitions for retrieved data fields (CDRDF).
4. Generate conceptual schema data definitions for runtime search parameters or update values (CDMSG).
5. Generate Working Storage and Procedure Division code for the conceptual schema to internal schema transformation of runtime search parameters or update values (CDCI).
6. Generate Working Storage and Procedure Division code for the internal schema to conceptual schema transformation of retrieved data fields (CDIC).
7. Generate internal schema data definitions for qualified data fields (CDQDF).
8. Combine two work files into one file containing the Request Processor program (CDCWF).
9. Generate macros with the proper substitution parameters (CDMACR).

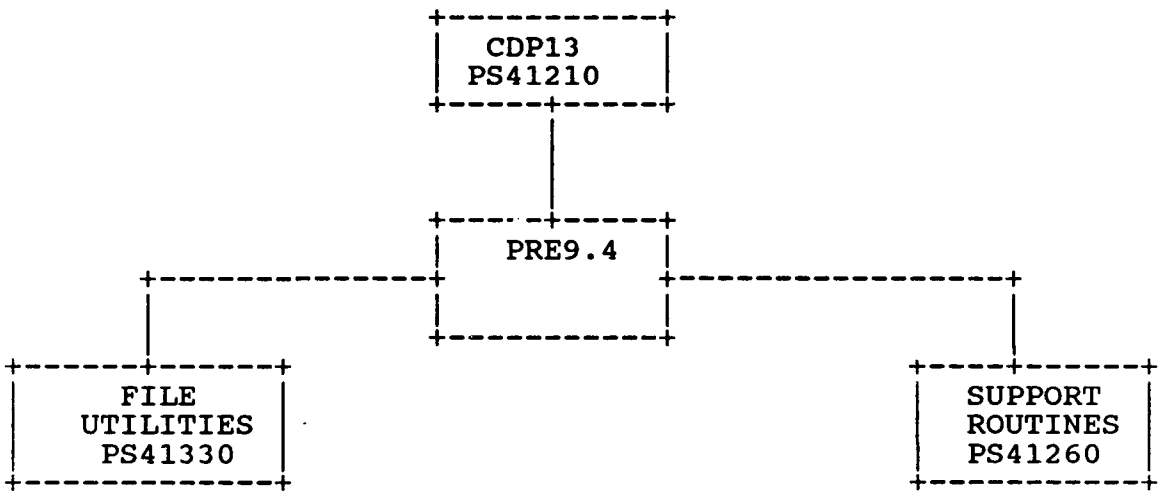
3.2 Functional Flow

This CPCI implements the logic defined in the Development Specification for this CPCI. Details of inputs/outputs and relationships between modules are to be found in Section 3.10.

This CPCI has been designated to operate in a batch or interactive mode. It must operate in the system environment established for IISS; that is, use of the Network Transaction Manager. It must use the ORACLE Database Management System installed on a DEC VAX computer.

3.3 Interfaces

The following diagram depicts the interface of PRE9.4 with other CPCI's in the program



3.3.1 Inputs/Outputs

The following table depicts the inputs ard outputs of this CPCI. A detail description for each item can be found in the DS for this CPCI.

Function: PRE9.4

INPUT	OUTPUT
Database Identification Number	Generated File Name
Database Name	Function Status
Library Name	
Target Host	
Current host	
Request Processor Name	
Current Subtransaction	
Internal Schema Action List	
Internal Schema Qualify List	
Conceptual Schema Action List	
Conceptual Schema Qualify List	
Result Field Table	
Set Table	
Generic CODASYL Command Table	
Record Key Table	
Application Process Information Table	
Error File Name	
Character Null Value	
Integer Null Value	
Complex Mapping Algorithm Table	
Subtransaction Boolean List	
Boolean List	

3.4 Program Interrupts

Not applicable to this CPCI.

3.5 Timing and Sequencing Description

This CPCI is called upon by the Request Processor Control Module, CDP13, for every TOTAL subtransaction identified by the current NDML request being precompiled.

3.6 Special Control Features

Not applicable to this CPCI.

3.7 Storage Allocation

3.7.1 Database Definition

The database used by this CPCI is the Common Data Model (CDM) database. This model is defined by the CDM1, the IDEF-1 model of the CDM, Reference Document Number 3. The database was constructed using ORACLE.

3.7.1.1 File Description

No permanent files have been defined for this CPCI. It may use temporary scratch files for the generated program source code.

3.7.1.2 Table Description

All tables used by this CPCI have been defined by the Development Specification for this CPCI.

3.7.1.3 Item Description

Not applicable to this CPCI.

3.8 Object Code Creation

The object code for this CPCI will be created by the system integration test team by using defined IISS Software Configuration Management procedures. This CPCI will use the COBOL, FORTRAN, and C language compilers.

3.9 Adaptation Data

This CPCI has been coded using ANSI COBOL. The intent was to provide a transportable system. Any system environment supporting these languages, a virtual memory

management scheme, the COMM and NTM subsystems of IISS and the ORACLE Database Management System should be able to support this CPCI. Every possible attempt has been to localize and identify any machine or environment dependent modules through the original design of the IISS and application of Configuration Management Procedures.

3.10 Detail Design Description

The following sections have been computer generated for this CPCI.

3.10.1 Where Include File Used List

The following lists each include file in the documentation group and all the modules documented in this specification which include them. The purpose of each module is listed as well.

DOCGROUP PS41256 Where-include-file-used List

Include File	Module Name
CHKCDM	
	CDGTLDD
	CDRSLDF
ERRCDM	
	CDGTLDD
	CDQPT
	CDRSLDF
ERRFS	
	CDGTLDD
	CDQPT
EOD	
	CDGTLDD
	CDRSLDF
ERRPRO	
	CDGTLDD
	CDQPT
	CDRSLDF
INSTTBL	
	CDQPT
SBSTLST	
	CDQPT
STDRESP	
	CDQPT
COBOLOP	
	CDQPT
ISAL	
	CDQPT
ISQUAL	
	CDQPT
RFTABLE	
	CDQPT

DOCGROUP PS41256 Where-include-file-used List

Include File	Module Name
CSAL	CDQPT
CSQUAL	CDQPT
CMAT	CDQPT
SETTAB	CDQPT
BOOLST	CDQPT
SUBBOOL	CDQPT
APGC	CDQPT
APINFO	CDQPT
APRK	CDQPT

3.10.2 Where External Routine Used List

The following lists each external function or routine in the documentation group and all the documented modules which call it. The purpose of each module is listed as well.

DOCGROUP PS41256 Where-external-routine-used List

System Module	Module Name
SQLSCA	
	CDGTLDD
	CDRSLDF
SQLBS1	
	CDGTLDD
	CDRSLDF
SQLSCH	
	CDGTLDD
	CDRSLDF
SQLSCC	
	CDGTLDD
	CDRSLDF
SQLTOC	
	CDGTLDD
SQLOSQ	
	CDGTLDD
	CDRSLDF
SQLADR	
	CDGTLDD
	CDRSLDF
SQLAB1	
	CDGTLDD
	CDRSLDF
SQLEXE	
	CDGTLDD
	CDRSLDF
SQLCLS	
	CDGTLDD
SQLAD1	
	CDGTLDD
	CDRSLDF

DOCGROUP PS41256 Where-external-routine-used List

System Module	Module Name
SQLFCH	
	CDGTLDD
	CDRSLDF
OUTFIL	
	CDGTLDD
	CDQPT
ERRPRO	
	CDGTLDD
	CDQPT
	CDRSLDF
GENFIL	
	CDQPT
OPNFIL	
	CDQPT
CDRFT	
	CDQPT
CDPRM	
	CDQPT
CDGENRT	
	CDQPT
CDRDF	
	CDQPT
CDQDF	
	CDQPT
CDRTSND	
	CDQPT
CDPIC	
	CDQPT
CDCMPRM	
	CDQPT
CDGTV	

DOCGROUP PS41256 Where-external-routine-used List

System Module	Module Name
	CDQPT
CDMSG	
	CDQPT
CDRPCIF	
	CDQPT
CDQPOP	
	CDQPT
CDRPIIF	
	CDQPT
CDRPMIF	
	CDQPT
CDRPUIF	
	CDQPT
CLSFIL	
	CDQPT
CDCWF	
	CDQPT
CDMACR	
	CDQPT
RPTERR	
	CDQPT
SQLTFL	
	CDRSLDF
SQLOPN	
	CDRSLDF

3.10.3 Main Program Parts List

The following lists each Main Program in the documentation group and all the modules which are called either by that module itself or by any of the documented modules which it calls. It is possible for a non-main module to be listed more that once if it is called by multiple modules. The called modules, in this case known as program parts, are marked as to whether they are documented here. If so, the phrase "well-defined module" appears by the module name, if not it is an "external "routine". The Purpose of the Main Program module is listed as well.

DOCGROUP PS41256 Main Program Parts List

Main Pgm Name	Module Name	Module Type
CDGTLDD		
	SQLSCA	External routine
	SQLBS1	External routine
	SQLSCH	External routine
	SQLSCC	External routine
	SQLTOC	External routine
	SQLOSQ	External routine
	SQLADR	External routine
	SQLAB1	External routine
	SQLEXE	External routine
	SQLCLS	External routine
	SQLAD1	External routine
	SQLFCH	External routine
	OUTFIL	External routine
	ERRPRO	External routine
CDQPT		
	OUTFIL	External routine
	ERRPRO	External routine
	GENFIL	External routine
	OPNFIL	External routine
	CDRSLDF	Well-defined module
	CDRFT	External routine
	CDPRM	External routine
	CDGENRT	External routine
	CDRDF	External routine
	CDQDF	External routine
	CDGTLDD	External routine
	CDRTSND	External routine
	CDPIC	External routine
	CDCMPRM	External routine
	CDGTV	External routine

DOCGROUP PS41256 Main Program Parts List

Main Pgm Name	Module Name	Module Type
	CDMSG	External routine
	CDRPCIF	External routine
	CDQPOP	External routine
	CDRPIIF	External routine
	CDRPMIF	External routine
	CDRPUIF	External routine
	CLSFIL	External routine
	CDCWF	External routine
	CDMACR	External routine
	RPTERR	External routine
CDRSLDF		
	SQLSCA	External routine
	SQLBS1	External routine
	SQLSCH	External routine
	SQLSCC	External routine
	SQLOSQ	External routine
	SQLADR	External routine
	SQLAB1	External routine
	SQLEXE	External routine
	SQLAD1	External routine
	SQLFCH	External routine
	ERRPRO	External routine
	SQLTFL	External routine
	SQLOPN	External routine

3.10.4 Module Documentation

The following documentation describes information which is specific to each individual module in the documentation group being documented in this specification. It provides a compact way of getting information that would be otherwise buried within each module's source code.

The specific items in this module documentation have the following meanings:

NAME: Name of program Module.

PURPOSE: Purpose of Module as detailed in the source code.

LANGUAGE: Programming language source code is written in.
The choices are:
VAX-11 FORTRAN
C (I/S-1 Workbench 'C')
VAX-11 COBOL

MODULE TYPE:	Whether a Program, Subroutine, or Function.
SOURCE FILE:	Name of Source File from file specification.
SOURCE FILE TYPE:	Source File Extension from file specification.
HOST:	Whether this is a host-dependent routine (VAX or IBM) or blank if host-independent.
SUBSYSTEM:	IISS sub-system this file resides in.
SUBDIRECTORY:	Sub-directory of that subsystem in which this file resides.
DOCUMENTATION GROUP:	Name of documentation group of which this source file is a member.
DESCRIPTION:	A description of the module as otained from the source code.
ARGUMENTS:	The arguments with which this routine is called if it is a Subroutine or a Function.
INCLUDE FILES:	A list of all the files that are included into this module as well as their purposes.
ROUTINES CALLED:	Subroutines or Functions, either documented or external, called by this module, if any.
CALLED DIRECTLY BY:	The documented routines which call this module, if any.
USED IN MAIN PROGRAM(S):	The documented Main Programs which contain this module in their parts list according to the list in section 3.10.3.

The Module Documentation is arranged alphabetically according to Module Name.

DOCGROUP PS41256 Module Documentation

NAME: CDGTLDD
PURPOSE: ACCESS THE CDM DF TO RETRIEVE THE DATA FIELD NAME
LANGUAGE: VAX-11 COBOL
SOURCE FILE: CDGTLDD
SOURCE FILE TYPE: PCO
HOST:
SUBSYSTEM: CDM
SUBDIRECTORY: NDML

DESCRIPTION:

- ACCESS THE CDM ENTITY CLASS DATA-FIELD
TO RETRIEVE THE DATA FIELD NAME(DF-ID).
IF NO ENTRIES ARE FOUND, GENERATE A
THE APPROPRIATE USER ERROR MESSAGE
AND TERMINATE PROCESSING. FOR EACH
ENTRY RETRIEVED, GENERATE AN 03 LEVEL
DATA DEFINITION.

ARGUMENTS:

FCB-W	DSPLY[S9(9)]
DBID	DSPLY[9(6)]
RTID	DSPLY[X(30)]
RET-STATUS	DSPLY[X(5)]

INCLUDE FILES:

CHKCDM
ERRCDM
ERRFS
EOD
ERRPRO

ROUTINES CALLED:

SQLSCA
SQLBS1
SQLSCH
SQLSCC
SQLTOC
SQLOSQ
SQLADR
SQLAB1
SQLEXE
SQLCLS
SQLAD1
SQLFCH
OUTFIL
ERRPRO

DOCGROUP PS41256 Module Documentation

NAME: CDQPT
PURPOSE: GENERATE REQUEST PROCESSOR FOR TOTAL DATA BASE
LANGUAGE: VAX-11 COBOL
SOURCE FILE: CDQPT
SOURCE FILE TYPE: COB
HOST:
SUBSYSTEM: CDM
SUBDIRECTORY: NDML

DESCRIPTION:

- THIS PROGRAM IS A COMPILE-TIME MODULE WHOSE PURPOSE IS TO GENERATE THE COBOL SOURCE CODE NECESSARY TO SATISFY AN NDML SUBTRANSACTION REQUEST AGAINST A TOTAL DATABASE. THE TOTAL QP EXTRACTS DATA THROUGH LINKPATHS USING TOTAL AS THE DBMS AND IBM AS THE HOST COMPUTER, AND THEN REFORMATS THE DATA INTO A SEQUENTIAL FILE.
NOTE: JANUARY 6, 1985 CHANGES. ALL "MOVES" TO LIBRARY-NAME HAVE BEEN REMOVED AND THE ITEM WILL BE A PARAMTER PASSED FROM CDP13 WHEN THIS ROUTINE IS CALLED.

MODIFIED FOR RELEASE 2.3 -- JUNE 23,1986.

ARGUMENTS:

QPGT-DBID	DSPLY[9(6)]
QPGT-DBMOD-NAME	DSPLY[X(6)]
LIBRARY-NAME	DSPLY[X(30)]
CHARACTER-NULL-VALUE	DSPLY[X(30)]
NUMERIC-NULL-VALUE	DSPLY[X(30)]
HOST	DSPLY[X(3)]
MY-HOST	DSPLY[X(3)]
QPGT-QP-NAME	DSPLY[X(10)]
QPGT-SUBTRANS-ID	DSPLY[999]
IS-ACTION-LIST	RECRD
IS-QUALIFY-LIST	RECRD
CS-ACTION-LIST	RECRD
CS-QUALIFY-LIST	RECRD
RFT	RECRD
COMPLEX-MAPPING-ALG-TABLE	RECRD
SUBTRANS-BOOLEAN-LIST	RECRD
BOOLEAN-LIST	RECRD
SET-TABLE	RECRD
GC-TABLE	RECRD
RECORD-KEY-TABLE	RECRD
AP-INFO-TABLE	RECRD
FCB-E	DSPLY[S9(9)]
GEN-FILE-NAME	DSPLY[X(80)]
RET-STATUS	DSPLY[X(5)]

INCLUDE FILES:

ERRCDM
ERRFS
INSTTBL
SBSTLST
STDRESP
COBOLOP
ISAL
ISQUAL
RFTABLE
CSAL
CSQUAL
CMAT
SETTAB
BOOLST
SUBBOOL
APGC
APINFO
APRK
ERRPRO

ROUTINES CALLED:

GENFIL
OPNFIL
CDRSLDF
CDRFT
CDPRM
CDGENRT
CDRDF
CDQDF
CDGTLDD
CDRTSND
CDPIC
CDCMPRM
CDGTV
CDMSG
CDRPCIF
CDQPOP
CDRPIIF
CDRPMIF
CDRPUIF
CLSFIL
CDCWF
CDMACR
OUTFIL
RPTERR
ERRPRO

DOCGROUP PS41256 Module Documentation

NAME: CDRSLDF
PURPOSE: RETRIEVE DATA FIELD USED AS THE SET LINK. AND TYPE
LANGUAGE: VAX-11 COBOL
SOURCE FILE: CDRSLDF
SOURCE FILE TYPE: PCO
HOST:
SUBSYSTEM: CDM
SUBDIRECTORY: NDML

DESCRIPTION:

- ACCESS THE CDM ENTITY CLASS DF USED AS SET LINKAGE WITH THE CURRENT DATABASE ID, SET ID, AND THE RECORD ID. RETRIEVE THE DATA FIELD USED AS THE SET LINKAGE AND THE LINKAGE TYPE. VERIFY THAT THE LINKAGE TYPE VARIABLE HAS THE VALUE OF "S".

ARGUMENTS:

QPGT-DBID-TEMP	DSPLY[9(6)]
SS-SETID-TEMP	DSPLY[X(30)]
ST-MEMBER-TEMP	DSPLY[X(30)]
DF-ID	DSPLY[X(30)]
DF-NO	DSPLY[9(6)]
LINKAGE-TYPE	DSPLY[X]
RET-STATUS	DSPLY[X(5)]

INCLUDE FILES:

CHKCDM
ERRCDM
EOD
ERRPRO

ROUTINES CALLED:

SQLSCA
SQLBS1
SQLSCH
SQLSCC
SQLTFL
SQLOPN
SQLOSQ
SQLADR
SQLAB1
SQLEXE
SQLAD1
SQLFCH
ERRPRO

3.10.5 Include File Descriptions

The following list contains a purpose and description of each include file in the documentation group as specified in the source code. The language it is written in is also given.

DOCGROUP PS41256 Include File Description

FILE NAME: APGC
PURPOSE: GENERIC CODASYL COMMAND TABLE
LANGUAGE: VAX-11 COBOL

DESCRIPTION:

HOLDS THE GENERIC CODASYL DML COMMANDS FOR AN ACCESS PATH OF AN NDML REQUEST

DOCGROUP PS41256 Include File Description

FILE NAME: APINFO
PURPOSE: ACCESS PATH INFORMATION TABLE
LANGUAGE: VAX-11 COBOL

DESCRIPTION:

THIS IS A COLLECTION OF INFORMATION STORED IN A NUMBER OF VARIOUS TABLES USED BY THE ACCESS PATH TABLE AND THE GENERIC CODASYL TABLE. SEE CDMP SPEC, PRE6 APINFO.INC

DOCGROUP PS41256 Include File Description

FILE NAME: APRK
PURPOSE: TABLE OF RECORD KEYS FOR CODASYL ACCESS PATHS
LANGUAGE: VAX-11 COBOL

DESCRIPTION:

CONTAINS INFORMATION FOR THE KEYS OF RECORDS CONTAINED IN THE CURRENT ACCESS PATH

DOCGROUP PS41256 Include File Description

FILE NAME: BOOLST
PURPOSE: BOOLEAN LIST
LANGUAGE: VAX-11 COBOL

DESCRIPTION:

CONTAINS THE BOOLEAN OPERATORS, PARENTHESES, AND POINTERS TO THE TYPE 2 CONDITIONS FOR AN NDML TRANSACTION

DOCGROUP PS41256 Include File Description

FILE NAME: CHKCDM
PURPOSE: IISS CDMP CHECK STATUS CODES
LANGUAGE: VAX-11 COBOL

DESCRIPTION:

CONTAINS ALL STATUS CODES FOR THE CDMP MODULES *

DOCGROUP PS41256 Include File Description

FILE NAME: CMAT
PURPOSE: COMPLEX MAPPING ALGORITHM TABLE
LANGUAGE: VAX-11 COBOL

DESCRIPTION:

THIS TABLE IDENTIFIES THE SOFTWARE MODULES AND PARAMETERS THAT ARE NEEDED TO PERFORM COMPLEX MAPPINGS BETWEEN CS AND IS FORMATS

DOCGROUP PS41256 Include File Description

FILE NAME: COBOLOP
PURPOSE: WORKING STORAGE VARIABLES OPERATOR TRANSLATION
LANGUAGE: VAX-11 COBOL

DESCRIPTION:

DOCGROUP PS41256 Include File Description

FILE NAME: CSAL
PURPOSE: CONCEPTUAL SCHEMA ACTION LIST
LANGUAGE: VAX-11 COBOL

DESCRIPTION:

TABLE TO HOLD CONCEPTUAL DATA ABOUT THE REQUEST

NOTE!!!!!! This table is cloned in both cdpre5 and cdpre4 so any changes made to this structure needs to be made in these cloned versions. Clone version is CSALX for CDPRE4.

NOTE AGAIN Any changes to the CS-ACTION-ENTRY must be reflected in CDP10B in the C code generation section. The length of CS-STRING2 has been hard coded in the generated C code in paragraph 210-GEN-MOVE-OF-TABLES.

***** THE CONCEPTUAL SCHEMA ACTION LIST

DOCGROUP PS41256 Include File Description

FILE NAME: CSQUAL
PURPOSE: CONCEPTUAL SCHEMA QUALIFY LIST
LANGUAGE: VAX-11 COBOL

DESCRIPTION:

CONTAINS CONCEPTUAL SCHEMA INFORMATION FOR THE REQUEST'S QUALIFICATION

NOTE!!!!!
This table is cloned as CSQUALX in CDPRE4. If it is changed, CSQUALX must be changed also.
THE CONCEPTUAL SCHEMA QUALIFY LIST

DOCGROUP PS41256 Include File Description

FILE NAME: EOD
PURPOSE: SQL END OF DATA DEFINITION
LANGUAGE: VAX-11 COBOL

DESCRIPTION:

DOCGROUP PS41256 Include File Description

FILE NAME: ERRCDM
PURPOSE: IISS ERROR STATUS CODES FOR CDMP MODULES
LANGUAGE: VAX-11 COBOL

DESCRIPTION:

CONTAINS ALL ERROR CODES USED BY CDMP *
MODULES FOR ERROR HANDLING *

DOCGROUP PS41256 Include File Description

FILE NAME: ERRFS
PURPOSE: ERRFS.INC - FILE I/O PRIMITIVES (FILE SERVICES)
LANGUAGE: VAX-11 COBOL

DESCRIPTION:

DOCGROUP PS41256 Include File Description

FILE NAME: ERRPRO
PURPOSE: PROCESS ERROR INCLUDE FILE
LANGUAGE: VAX-11 COBOL

DESCRIPTION:

DOCGROUP PS41256 Include File Description

FILE NAME: INSTTBL
PURPOSE: TABLE CONTAINING ALL GENERIC CODASYL COMMANDS
LANGUAGE: VAX-11 COBOL

DESCRIPTION:

DECODE FOR THE GENERIC CODASYL COMMANDS

DOCGROUP PS41256 Include File Description

FILE NAME: ISAL
PURPOSE: INTERNAL SCHEMA ACTION LIST
LANGUAGE: VAX-11 COBOL

DESCRIPTION:

CONTAINS INTERNAL SCHEMA INFORMATION ABOUT AN NDML REQUEST

THE INTERNAL SCHEMA ACTION LIST

DOCGROUP PS41256 Include File Description

FILE NAME: ISQUAL
PURPOSE: INTERNAL SCHEMA QUALIFY LIST
LANGUAGE: VAX-11 COBOL

DESCRIPTION:

CONTAINS INTERNAL SCHEMA INFORMATION FOR AN NDML QUALIFICATION

THE INTERNAL SCHEMA QUALIFY LIST

DOCGROUP PS41256 Include File Description

FILE NAME: RFTABLE
PURPOSE: THE RESULT FIELD TABLE
LANGUAGE: VAX-11 COBOL

DESCRIPTION:

CONTAINS CONCEPTUAL SCHEMA INFORMATION ABOUT
THE RESULTS OF AN NDML REQUEST

DOCGROUP PS41256 Include File Description

FILE NAME: SBSTLST
PURPOSE: WS DEFINITION FOR THE SUBSTITUTION LIST TABLE
LANGUAGE: VAX-11 COBOL

DESCRIPTION:

SUBSTITUTION-LIST REPRESENTS THE INPUT TABLE
OF SUBSTITUTION PARAMETERS FOR THE CDMACR
MACRO EXPANSION SUBROUTINE

DOCGROUP PS41256 Include File Description

FILE NAME: SETTAB
PURPOSE: LIST OF SETS OWNER-MEMBER RELATIONSHIPS
LANGUAGE: VAX-11 COBOL

DESCRIPTION:

SET TABLE TO KEEP TRACK OF CODASYL NDML REQUESTS
IN TERMS OF OWNER AND MEMBER RELATIONSHIPS

DOCGROUP PS41256 Include File Description

FILE NAME: STDRESP
PURPOSE: WS DEFINITION FOR STANDARD STATUS VARIABLE
LANGUAGE: VAX-11 COBOL

DESCRIPTION:

THE STANDARD 'PROCESS COMPLETE' MESSAGE

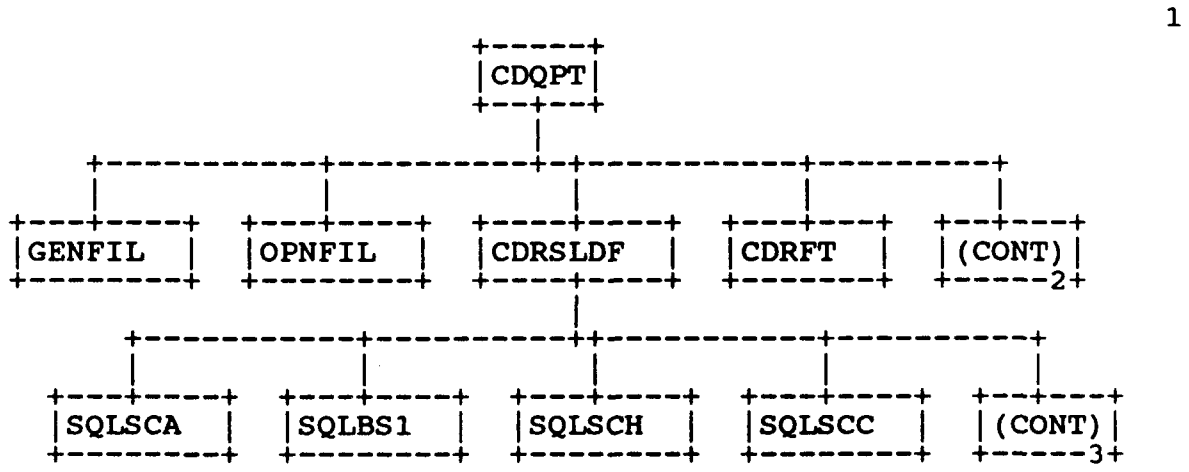
DOCGROUP PS41256 Include File Description

FILE NAME: SUBBOOL
PURPOSE: SUBTRANS BOOLEAN LIST
LANGUAGE: VAX-11 COBOL

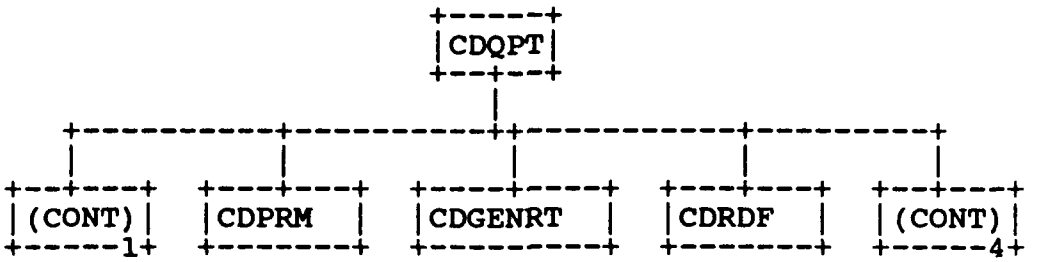
DESCRIPTION:

CONTAINS ALL THE BOOLEAN OPERATORS, PARENTHESES, AND CONDITIONS WHICH CAN BE SATISFIED AT THE INTERNAL SCHEMA LEVEL, FOR EACH SUBTRANSACTION.

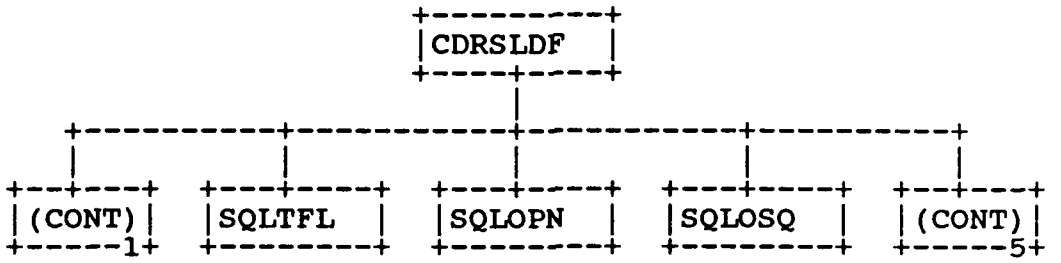
3.10.6 Hierarchy Chart



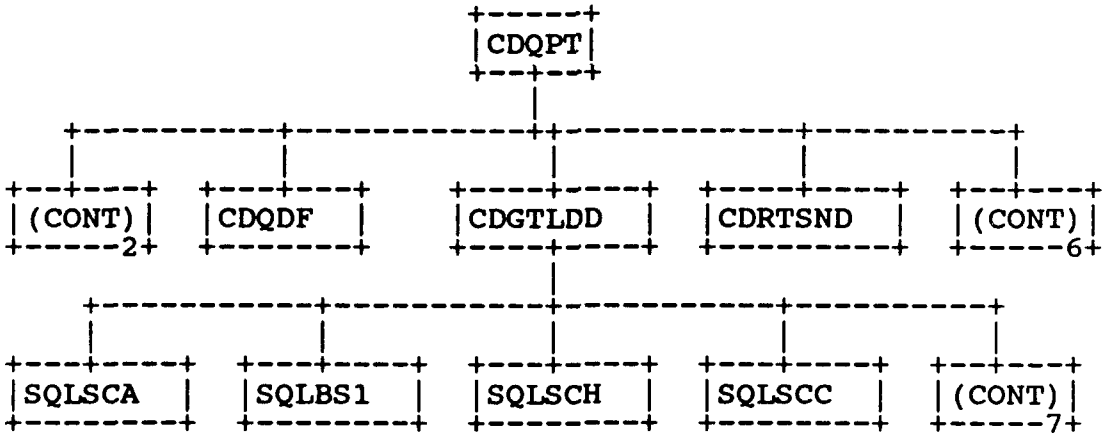
2


CDQPT
(CONT)
1
CDPRM
CDGENRT
CDRDF
(CONT)
4

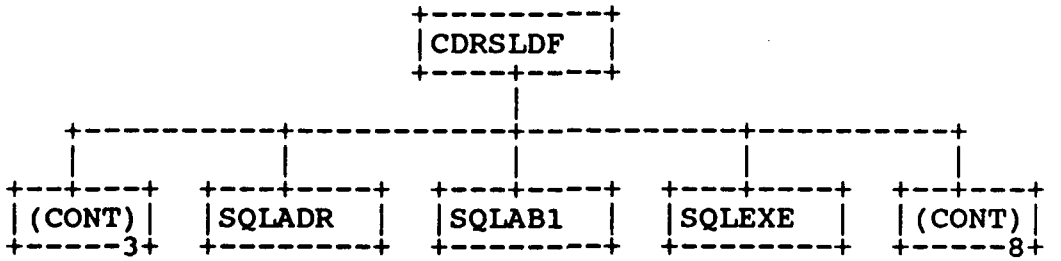
3


CDRSLDF
(CONT)
1
SQLTFL
SQLOPN
SQLOSQ
(CONT)
5

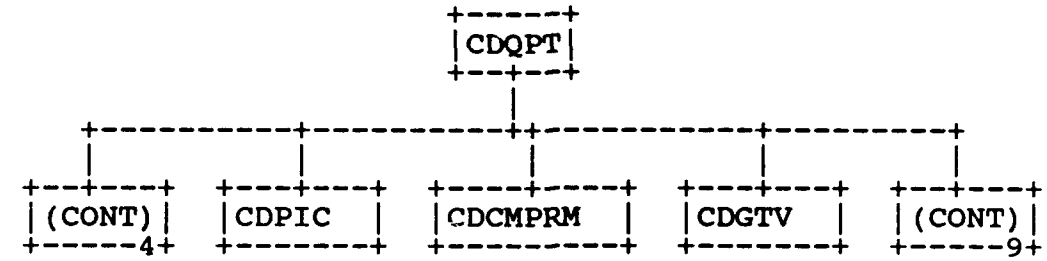
4


CDQPT
(CONT)
2
CDQDF
CDGTLDD
CDRTSND
(CONT)
6
SQLSCA
SQLBS1
SQLSCH
SQLSCC
(CONT)
7

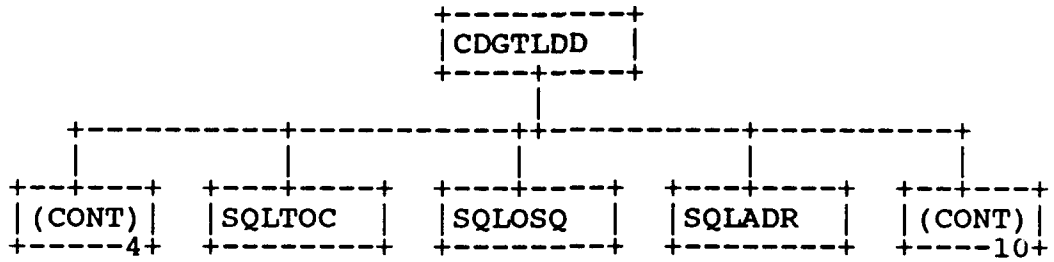
5


CDRSLDF
(CONT)
3
SQLADR
SQLAB1
SQLEXE
(CONT)
8

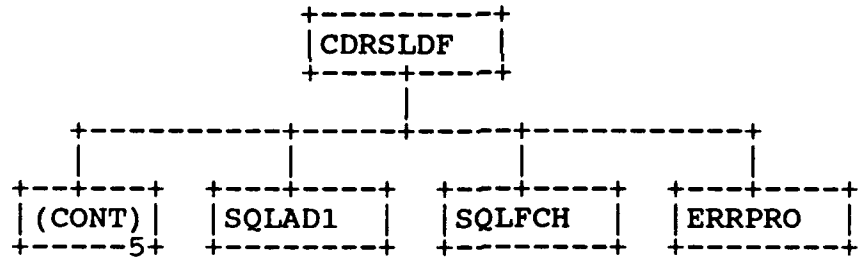
6


CDQPT
(CONT)
4
CDPIC
CDCMPRM
CDGTV
(CONT)
9

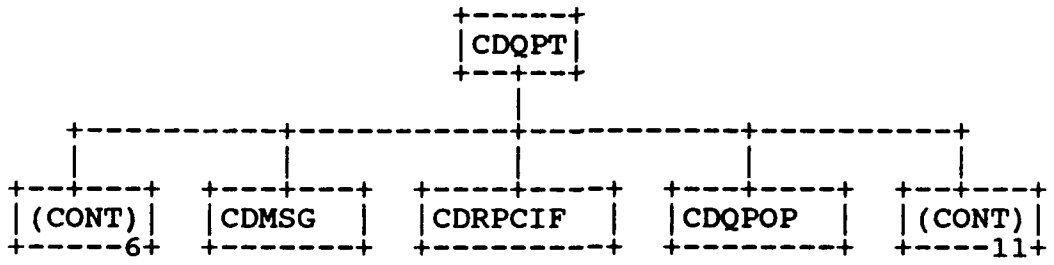
7


CDGTLDD
(CONT)
4
SQLTOC
SQLOSQ
SQLADR
(CONT)
10

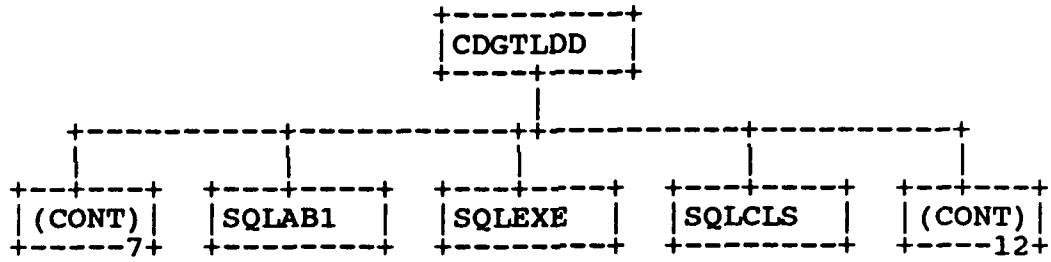
8


CDRSLDF
(CONT)
5
SQLAD1
SQLFCH
ERRPRO

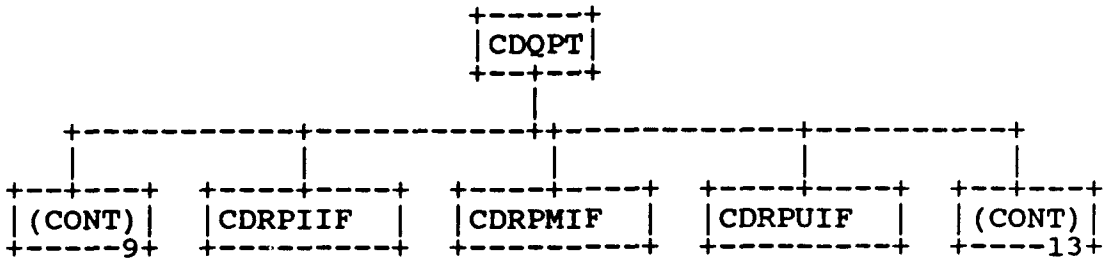
9


CDQPT
(CONT)
6
CDMSG
CDRPCIF
CDQPOP
(CONT)
11

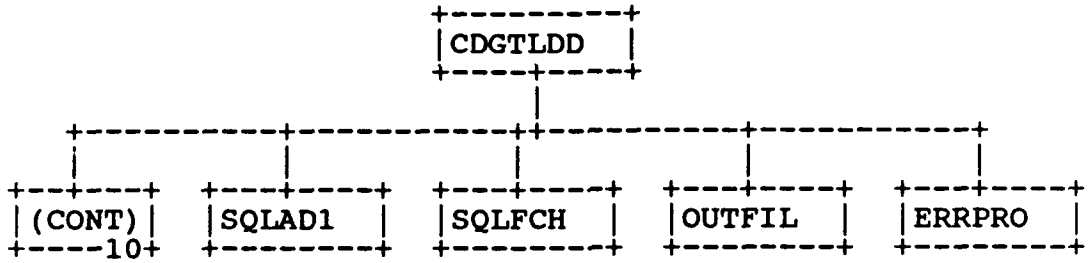
10


CDGTLDD
(CONT)
7
SQLAB1
SQLEXE
SQLCLS
(CONT)
12

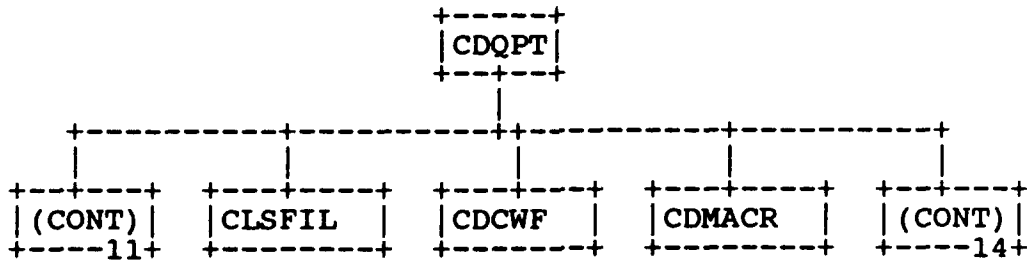
11

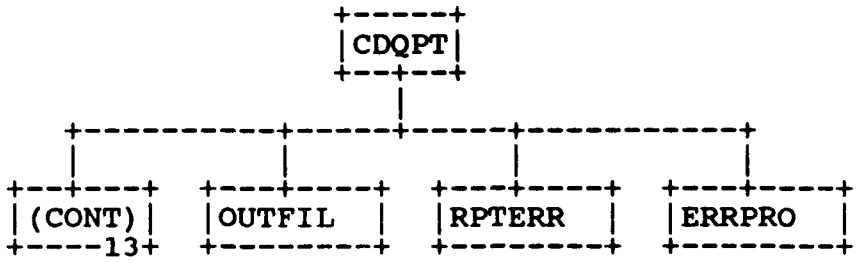

CDQPT
(CONT)
9
CDRPIIF
CDRPMIF
CDRPUIF
(CONT)
13

12


CDGTLDD
(CONT)
10
SQLAD1
SQLFCH
OUTFIL
ERRPRO

13


CDQPT
(CONT)
11
CLSFIL
CDCWF
CDMACR
(CONT)
14



CDCMPRM
CDCWF
CDGENRT
CDGTLDD 4
CDGTV
CDMACR
CDMSG
CDPIC
CDPRM
CDQDF
CDQPOP
CDQPT.....1
CDRDF
CDRFT
CDRPCIF
CDRPIIF
CDRPMIF
CDRPUIF
CDRSLDF 1
CDRTSND
CLSFIL
ERRPRO
GENFIL
OPNFIL
OUTFIL
RPTERR
SQLAB1
SQLAD1
SQLADR
SQLBS1
SQLCLS
SQLEXE
SQLFCH
SQLOPN
SQLOSQ
SQLSCA
SQLSCC
SQLSCH
SQLTFL
SQLTOC

3.11 Program Listings Comments

This information is contained in the Module Descriptions in section 3.10.

SECTION 4

QUALITY ASSURANCE PROVISIONS

4.1 Introduction and Definitions

"Testing" is a systematic process that may be preplanned and explicitly stated. Test techniques and procedures may be defined in advance, and a sequence of test steps may be specified. "Debugging" is the process of isolation and correction of the cause of an error.

"Antibugging" is defined as the philosophy of writing programs in such a way as to make bugs less likely to occur and when they do occur, to make them more noticeable to the programmer and the user. In other words, as much error checking as is practical and possible in each routine should be performed.

4.2 Computer Programming Test and Evaluation

The quality assurance provisions for test consists of the normal testing techniques that are accomplished during the construction process. They consist of design and code walk-throughs, unit testing, and integration testing. These tests are performed by the design team. Structured design, design walk-through and the incorporation of "antibugging" facilitate this testing by exposing and addressing problem areas before they become coded "bugs."

☆U.S. GOVERNMENT PRINTING OFFICE: 1992 - 648-127/62321